

DAYTON RACE MEET ISSUE

# AVIATION

*The Oldest American Aeronautical Magazine*

OCTOBER 13, 1924

Issued Weekly

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Crossing the line at Dayton. Miniature skyscrapers in background

VOLUME  
XVII

## SPECIAL FEATURES

SPECIAL ARTICLES ON THE DAYTON MEET

By

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OCTOBER 13, 1924

# AVIATION

Published every Monday

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GENERAL MANAGER

# AVIATION

VOL. XVII

OCTOBER 13, 1924

No. 15

#### Captain Sheel's Crash

WHEN we last left, the only value that can be derived from disasters is that prevent repetition. The loss of Lieutenant Peacock and the fastest airplane in the world should be the greatest tragedy before the races. In that case the reason that produced the snapping of the wings were obvious and probably will remain obscure. But at least at the Peacock race when one of our greatest pilots failed, the cause was not as easily found as in the last two serious accidents.

Lieutenant Hart Sheel was a pilot of that rare group of speed experts that has been developing over the last three years. They are the "America First in the Air" as the only way that we can be in any international exhibition by raising their trees to the sky in record times.

Over the three days he held under different conditions the record at Detroit and St. Louis. There the man was honored by their manufacturers and designers and the skilled mechanics who had followed the construction, testing and development of their particular engines. This year the young mechanics were honored entirely by Army personnel. Some of the motors had been repaired after minor breakage, one engine had been modified and what is most important the propellers were changed. It is too early to determine what else the change of propellers had or whether or not it is any way affected the showing up of the speeds this year.

But the propeller situation in this country which has had its ups and downs before should be given more thoroughly in an effort to determine whether or not this was not directly responsible for the disqualification of Captain Sheel's plane and the humiliating experience of having his plane at St. Louis fall at the latter speeds than were made at Detroit. Representatives say that the propeller had cracked along the laminations, that one half of the propeller was and even worse, that the remaining propeller was twisted and the crack shaft broken. All of which supports the propeller failure theory.

With this in mind, the question now is to the superiority of the metal or wooden propellers for speeds of over 2000 r.p.m. will probably come to a head and a final decision made. Few of the six planes at St. Louis used metal propellers. This year the wooden propeller was used exclusively although it has been conceded that the metal propeller adds several miles an hour to the speed.

There is involved in this whole propeller problem the fundamental question of the engineering procedure of our Air Service. Whether or not an engineering laboratory that produces its own products can put on the products of others without loss in the rest of the whole industry. If not of the latter of these experiences there can easily a policy that will turn over the fundamental consideration of engineering problems, this will be the only connecting link of the craft line.

#### The Army Exhibition at Dayton

THE time is now when the plumb of language is necessary if we expect to take its proper place in our defense of National Defense. The unanimous opinion of every engineer, manufacturer and pilot that visited any of the races at Dayton was that the year's progress by the Army Air Service in the development of aircraft had been real.

The public seems loath to regard the National Air Races as the accepted method of becoming acquainted with the progress of aviation during the previous year. It is true that the Army gallantly serves types and vehicles the new developments. This year's meet of the kinds of Army aircraft development gave convincing and creditable proof that on the whole the Army had fallen down in the development and production of service types of planes.

Broadly speaking there are four large classifications of Army planes: training planes; observation planes; bombing planes; and pursuit planes.

Of training planes there were none at Dayton. True, the Army has some but they are almost exclusively motor planes somewhat revamped and quite rightly the Army does not wish to show them. Forty training planes have been ordered from a manufacturer who has no factory and they will not be ready till next year.

The observation plane race was won by a DH-4 as a record plane but designed by the British and put into production before the end of the war. The Army has a few models of more modern observation planes but none sufficiently superior to put into production.

The bombing plane race was won by a plane which was already built nine years ago, a wonderful example of long life but not of progress.

In the pursuit group alone there was real progress. The Curtiss pursuit not only showed high speed but extreme maneuverability.

After studying the Army exhibition at the Dayton meet the thoughtful public must realize that the Army Air Service has been successful in designing new types and in putting these types into production.

The Army liaison Congress and the body of appropriations bills with which still encumbered out of the Air Service appropriations one feels very doubtful as to whether that is the real cause. What a vicious circle fails to produce results either the personnel is changed and new people never or the concern is reorganized. There is a growing number of people who believe that a single air force is the only possible solution. Certainly a continuing party of several development is necessary and has hitherto been lacking. The matter should be thoroughly gone into by a Congressional committee and steps taken to remedy a situation which is threatening our national security.

LAWRENCE D'ORRY

VIRGILIA E. CLARK

EDWARD P. WARREN

RALPH H. UPTON

EDWARD T. ALLEN  
CONTRIBUTING EDITORS









attributed to the excellent work of the engineering division of *W. Wright Field*.

### Old Wright Plane Flies

When the big biplane had landed, after one or two of the several, and now daring, aerobatics, there was no one to see the marks the dust before—all marks being erased in one direction. And there appeared in the sky a Wright biplane of 1929 design, with four propellers driving through a chain transmission. And there came a similar biplane, but this one was not so modern, for its engines were substituted for the original Wrights, and its 600-hp engine was mounted in place of the original 40-hp Wright engine. Only an old Wright pilot could ever tell whether the ship performed better for all these changes.

East John A. MacCork Field flew the weathered old ship in the general road where it carried the late General Orville Wright and his sister, Miss Katharine Wright, could witness where the plane passed overhead, ahead of the earliest flying age.

Another flight was given the public when the Army airship T-2 came sailing along with a *Messenger* plane along its *T*-trusses.

## The Mitchell and Pulitzer Trophy Races

Of the two races the earliest racing pilots of the 1st Pursuit Group, from Selfridge Field, for the John L. Mitchell Trophy was by far the more interesting. In the first race, there were eleven entries, and all, save the Pulitzer team, were driven by men who had been competing since all recently started because they were strictly service types, aside the race on creating things to save. Second, the public was treated for the first time to a race between eleven PWS Curtiss Pursuit ships, and the way these formidable fighters whizzed around the course had been an eye opener even to experts.

The very previous month races for the Mitchell Trophy were contested on MFG and MHA pursuit ships, an experience which would still be mighty good as a first reserve in case of war, but which is far surpassed in performance by the new Curtiss and Boeing fighters. If the Dayton race revealed in the public that the Curtiss and Boeing were on a steady upward course for observation and bombing work, the Mitchell Trophy race at least showed that the 1st Pursuit Group can totally subordinate air fighting force—now composed of a small number of one of the world's finest fighting planes, the Curtiss PWS.

### A Symphony of Noise

The mere distance was 200 km. (123.27 mi.) and consisted of four laps over a 50 km. course. Eventually good speed was made in this event because of the flying start made by the contestants. It was the first race of the three days in which pilots circled the field for altitude and then dived into the

bottom of its enclosed course. When the strike had reached an altitude of 1900 m., the little plane was raised, and after a short sleep in the cockpit, Capt. Walter of Langley Field, took off in it and landed.

Finally Capt. Harold Harris took off on the Flying Bomber, and carried a useful load of 4000 kg in an altitude of 1800 m., staying up 3 hr 47 min. These records will be forwarded by the N.A.A. to the F.A.I. for authentication in due course.

The second event of the day was the 50 m. high plane race, the Dayton Daily News Trophy. This was won by J. M. Johnson of Dayton on the Wright-Judson plane, but it was a 4 cyl. antiaircraft engine, which averaged 88 m./hr. At the same time R. Donnelly at McCook Field, flying a plane of his own construction, was second at 84 m./hr.

A detailed account of the race was given by E. T. Allen, high plane editor of *Aviation*, will be found elsewhere that time. Mr. Allen, well also tell the story of the 50 m. race held the following day, which was won by H. C. Manning of Theodore City, La. T., who averaged 28 m./hr.

The third Dayton Air Meet ended Saturday, Oct. 4, with the high speed races for the John L. Mitchell at Paine Field.

Starting line past the timer's stand, right in front of the grandstand, then came at steep angles, as if diving into enemy planes, with the screaming air whirling around their frames, twisted wires and combining with the drama of the Curtiss D2 engine in an inferno of noise. It was an awe inspiring spectacle.

The winner of the race was Louis Cyrone Berlin, who averaged 126.66 m./hr. for the entire race. Close behind Berlin during the whole race was Louis Donald F. Stoen, who finished second with a total average speed of 125.73 m./hr.

An even harder contest developed between Stoen and Capt. Thomas R. Matthews, third place winner, who came in averaging 123.30 m./hr., only four tenths of a mile behind Berlin. These three pilots were the only ones to average over 120 m./hr. Three other pilots made the race, Capt. E. H. Bigelow, William Mitchell, Assistant Chief of Air Service.

### The Pulitzer Trophy Race

The fifth annual race for the Pulitzer Trophy, which includes the foremost high speed airplane among the world over, started under tragic auspices.

Four ships started at 10 a.m., the two Curtiss B2s from which one had first and second in the 1922 Pulitzer Race at Dayton, the Verville-Sperry plane which won in last year's race, and a new Curtiss PWSA pursuit plane.

The four ships took off from W. Wright Field in the order named and flew toward the starting line where they turned and climbed several hundred feet to dive into the race. The first Curtiss entry, piloted by Capt. Bert E. Stoen of Selfridge

Field, was just nearing the line in a fairly steep dive when suddenly it seemed to disintegrate and dive into the ground in a vertical nose dive.

### Sheel's Accident

The story happened so quickly that even experienced observers who have high-power glasses trained on Sheel's racer were unable to analyze what actually occurred. Bits of wreckage were seen floating down after the ship, but those bits had to be judged by reason of their appearance were agreed

from a careful examination of the wreckage, and apparently most accurate of Sheel's sudden dive, the general theory of the accident is that the propeller broke in the air and literally tore the engine to pieces. This would explain the facts that Lieutenant Brookley saw in the air and also the fact that parts of the engine were found on a 300 ft. radius. Both an explosion naturally would have also torn the engine from its bed and possibly have wrecked the center section the whole across the top wing to the fuselage. As



1922 Army Curtiss Racer which exploded in the air at the start of the 1924 Pulitzer Race, killing the Pilot, Capt. B. E. Stoen. Two of these ships were reconditioned, fitted with 500-hp. Curtiss D12A engines and awarded *Av Service Propellers* of McCook Field, and started as Dayton. The other, piloted by Capt. W. H. Brookley, finished 2nd in the Pulitzer Race at an average speed of 216.35 m./hr.

that no single part of the motor appeared to have given way. Lieutenant W. H. Brookley, who was flying the other Curtiss ship, which finished third, suffered a break on the latter ship just before it fell in the fatal dive.

The wreckage of the plane was found deeply embedded in 18 ft. of earth beside a creek which parallels the Government road to Dayton. The unfortunate pilot's body, which was badly contorted, was only found after the wreckage had been freed, in which required hours of work.

In the wreckage lots of the wreckage, including a large number of engine parts, were found within a radius of 200 ft. from where the plane had struck. They included several cylinders, parts of the valve gear, an oil strainer, etc. The greater portion of the engine, with one full bank of cylinders still in the engine and the badly shredded propeller were found lying dug out. It was noticed that while the blades of the propeller were broken, the hub and the transmission had passed through intact. The remainder was a mass of wreckage. Most parts of the fuselage were found at first, but one of the wings was discovered nearly intact. It was only after the fuselage had been entirely disassembled that Sheel's body was located together with portions of the fuselage and part of the wing.

As a result the top wing would have opened up in the middle, which would account for the numerous accounts that "everything exploded" or "exploded in a terrible manner," as pointed out by the lower wing. The propeller, however, with a portion of the fuselage, they must have struck together. This only reinforces the theory that the plane was wrecked by an explosion and not by a wing flying off as some hasty reporters stated.

This terrible accident quite naturally put a damper on the Pulitzer race. Captain Sheel was very popular as the leader of the Air Service, as well as in the aircraft industry and his tragic death caused general sorrow and sympathy for his widow and two small children.

### Captain Sheel's Career

Captain Sheel entered the Air Service Aug. 9, 1929. He had his primary training at McCook Field, Akron, Ohio, and his advanced training with the 3d Pursuit Group, which was then based at Langley Field, Va., on Oct. 1, 1930.

Before being transferred to the Air Service, he was an officer in the Infantry. He was promoted from Infantry to *Aviation*, 1930, with the headquarters troop of the 14th Division. From July to October of the same year he was stationed in the office of the general sales agent at Paris, and from No-



Line up for the start of the Pulitzer High Speed Race. L. to R. the Two Army Curtiss Racers, the Verville-Sperry and the Curtiss Pursuit.

September, 1926, to April, 1928, he was American delegate to the Inter-Allied underwater commission at Cologne and Dusseldorf, Germany.

He was transferred to the United States in December, 1928, and to the Air Service in August of the following year. Immediately before the start of the race, Captain Bassel was warning the spectators by an exhibition of daring stunts.

As he prepared to start on the final flight he remarked to

and the audience sitting through the air as an example of such a great technical achievement he allowed him to do for days. It's like a vacation of the day, and perhaps not so long, future.

Alfred Verville, aviation engineer of McCook Field, who is responsible for the design of that gallant racing plane, was congratulated on his well deserved success. In last year's Pulitzer race the ship did not have a chance to show what



1922 Fokker-Sperry Racer (500 hp. Curtis D-12 Special engine)—winner of the 1922 Pulitzer Race, with an average speed of 213.72 m.p.h.

its machine that he was "going to win that race or else."

After Sharp's accident the race for the Pulitzer, Fokker was watched by thousands of spectators. Some thought that the race returning to America—the PWRA is a straight general purpose race—was over, that they had been given a second chance, and that they were really built for one race—and for indefinite racing.

Therefore, a general sigh of relief went up when the last Pulitzer entry had safely landed. This took longer than the actual race, for Lieutenant Broadley, hamstrung by the death of his comrade and friend, Captain Curtis, never thought a good deal of starting before he had to land his ship in the dunes. It was a dog's life, but he did it.

The flight of the Verville-Sperry was extremely interesting to watch. It was over than that. It was not every day that one saw a giant machine of nothing but a single wing, a body and tail surfaces, dash the air. For that is all the Verville-Sperry was in flight before Lieutenant Mills, its pilot, had raised the remarkable biplane just past the wheel dumper in the spectrum panel, and the wheels disappeared in the uppermost feathers as when the Verville-Sperry and the Haw-Law raced did it in the Pulitzer race held at Detroit. There is something strangely gyroscopic about watching a plane fold up in landing gear in flight as one would fold up a card table.

Pearson's plan of aviation penance really should make one shiver with regard to all possible flight accidents, but that picture of the wheels folding up in flight

it was capable of prepossessing. An unbalanced propeller will not work when it is in flight, so the finding that the tail surfaces became practically inoperative and the pilot had to land his plane right after crossing the starting line.

This trouble was remedied shortly afterwards, the propeller being carefully rebalanced. Test flights as well as Long-distance flights ran fully bore out the expectations of Mr. Verville that the ship would prove very fast as well as very reliable. In fact, Fokker had nothing to do with this race although it spent 100 hours of 225 m.p.h. in over a telephone source. The propeller was not used in the race, however, owing to the Air Service ruling that all the four Pulitzer ships would be fitted with identical service propellers.

Lieutenant Broadley on the Oregon 96 was a silent runner up to Mills, and finished second averaging 214.25 m.p.h. which was about 50 m.p.h. faster than the time made by Capt. E. L. Martinson in the 1922 race. The 1922 Pulitzer race was won by Capt. W. H. Mills in Liberty Roads.

Capt. R. K. Storer of McCook Field was third on the Curtis PWSA 1450 hp. Curtis D-12, his average speed for the race being 207.85 m.p.h. He was \$1,000.

#### Trail Blazers and World Fliers

Loren Golden, G. Kelley and Ross McRae, two trail blazers, passed in review before the grandstand. Kelley flew in Denver from Vancouver, B. C., with McRae as a passenger. They passed over the Oregon trail in 15½ hr. from McCook Field to Oregon trail, years ago, and it took him six months to make the trip, then a half day.

The world then flew to Wilkes Wright from McCook Field, where they had crossed the day before, escorted by the Barron bomber and a squadron of army pursuit ships.

Later the world then passed in review before the grandstand on exhibition. They were greeted the entire length of the stands with roaring cheers.

Plane carrying the world flags, the winning ship of the John L. Mitchell Trophy race and the Raising banner from

and meeting of the Board of Governors of that organization was held on Sept. 26 at 501 Fifth Ave., New York. Harry M. Cross, Vice-President of the American Aeronautical Engineers, was elected First Vice-President. Alvin Jackson, Vice-President Standard Oil Company (Indiana), Chicago, Ill., was elected



The Curtiss PWSA plane, model PW.S.A. (460 hp. Curtis D-12 high compression engine), which finished third in the Pulitzer Trophy, maintaining an average speed of 187.95 m.p.h.

lined up in front of the judge's stand as General Mitchell, 2nd Vice-President, J. L. Calles, President Aeroplane Inc., Hammondsport, N. Y., was elected 3rd Vice-President. William W. Farnell, President, Farnell Aerial Camera Corp., New York, was elected Treasurer; S. S. Bowley, General Manager and Ass't. Treasurer; Lester K. Bell, Secretary, and Orson A. Sherman, Ass't. Secretary.

#### The Bombing of New York

The crowd body of the Dayton meet was for bombing, by a member of Marion Bombers, of a model city showing the



Pilot who finished first, second and third in the Pulitzer Trophy Race (L. to R.) Capt. W. H. Mills (Verville-Sperry), Capt. W. H. Broadley (Curtiss Racer), and Capt. R. K. Storer (Curtiss Pursuit).

sun drying of lower Manhattan. After a single lesson had been briefly wrung around the city, the bombers appeared method and method in their objective. They had reached the height of the trolley pylons, to anotherman. And so everybody out of the Airlinehalls went home highly pleased.

#### A.C.C. Elects Officers and Governors

Charles E. Lachman, Vice-President of the Wright Aeronautical Corp., Paterson, N. J., was elected President of the International Chamber of Commerce of Aviation at the

newly elected Board of Governors was elected, including the former general manager W. E. Young, Goodyear Tire & Rubber Co., Akron, Ohio; Frank P. Dyer, President, Aeroplane Inc., Hammondsport, N. Y.; George C. Lanning, President, Loring Aeronautical Engineering Corp., New York; G. V. Vissel, Vice-President, Farnell Motor Car Co., Detroit; B. D. Thomas, Thomas Morse Aircraft Corp., Rhine, N. Y.; Charles H. Colvin, President, Flanner Instrument Co., Brooklyn, N. Y.; Josephine M. President, The Douglas Company, Santa Monica, Calif.; J. M. Gandy, President, Johnson Airplane & Supply Co., Dayton, Ohio; George P. Tolman, Boeing Airplane Co., Seattle, Wash.



# An Engineer's View of the Races

By EDWARD P. WARNER

Professor of Aeronautics  
Mass. Inst. of Technology

The National Air Races have just been held for the fifth time. For the first time among these five occasions the Pulitzer, with no new machines entered, has failed to dominate the work, except through a temporary, and for the moment temporary, absence of the "Octo" race. The aircraft engineer has had, or should have had, a bitter choice, then, ever before to see what a year can bring forth in the way of design progress.

The evocative term of the verb in the last sentence was used advisedly. During apparently an unfruitful series

of years to compete against him on DH4s. From the policy point of view such a procedure would seem very unfair, but a recognition of the poverty observed at Dayton offers little to the engineer, who will be interested in the development of aircraft, and that is the primary object of a program of experimental development and basic purchases to quantity, so far as Army and Navy machines are concerned, that may not be very important. Any properly qualified person can see that at McCook Field, Indianapolis, or wherever else they may be seen, while they are still in the experimental stage, and still and accurate performance data quickly become available



Martin Commercial Model 70, Wright Ed 200 hp. engine, which, piloted by Cy Caldwell, won 2nd prize in the Aviation Team and Country Club Race for Speed and Efficiency.

of manufacturers, the situation with regard to progress and reliability, checked and reviewed in a state of continual stress, and degrees of unquestioned commerce were reported. It is expected from the field with some certainty, a claim being couched on the occasion of the first light plane race, when every man, with the exception of the technical press, and an article in the commercial section of the newspaper, immediately stated with the slaps that was given clear back by the longer, when the take-off characteristics could be observed such as the usual general was and whence, the most over-thrust, the competing machines could not even be mentioned without full glasses.

The most interesting, then, about the meet from a technical point of view was the startling dearth of new designs. Of the dozen entries, not comprising the Pulitzer Trophy and the Ohio-Hispano, the four which were completed only by the Army brought little thrill and not an incentive a year ago except the PWFA. There are new steps in plenty at McCook Field, but, with the exception of the two mentioned, perhaps because of similar interests, there was little to show. The first year, at least, did not bring to the pilot assigned to fly one of the more or less conservative machines such as was at St. Louis while ordering

the. In the case of the civilian machines, however, the more the early point of reliability, and it is to the credit that we shall look for evidence of progress. This year, except among the light planes and in a few other isolated sections, we did not find it.

Among the new ones, very, extremely, mentioned, were good numbers. The remaining five remained for the light planes, which will be reserved for separate consideration. The other three were all located in machines with power development below a specified figure, 800 cu in in the case and 210 in the third, and in all cases it was required that at least one passenger in addition to the pilot be provided for, with a maximum weight of 1,000 lbs. The first, the St. Louis, for slope with OX5s or other engines of substantially equivalent size was won by the same machine that took it in St. Louis, the Martini biplane, the speed being considerably higher this year than last but if memory serves correctly in the absence of last year's official figures. I am inclined to greatly suspect that the performance of that slope which appears to place many of the names, features except the form of the engine and its position before the fuselage, and which has not been riveted to an aerodynamically small wing area, and it

should be rated as an exceedingly interesting development, even if not exactly a new one. I have no means of knowing what power or aero engine selected for this particular purpose, but the maximum of a straightforward speed of about 100 m.p.h. for the OX5, a two-passenger load, and a reasonably good climb, empty and landing speed in a notable fact. Another encouraging novelty in the same event was the new Skeway, which there were several, and which attracted attention particularly by the extreme originality of the working around the nose and by the beautiful example of aeronauts working off by the engine.

## Winners in Speed Events

The winners in the 800 m. in speed events could hardly be said to be new. Guy Jones had surprised about a third of the wing on his Oxide, and would have "surprised" all of it had he not been limited by the engine which he was using through it did not have for a forced landing at the last part of the last lap in one race, after two victories were already planned to his credit. His retirement left the open cup for an NBS of pre-birth origin, the principal point of interest in the wing being the way in which the pilot adjusted the ground effect by flying at an altitude of some 100 ft. above the ground, and the way in which he was able to look down on them all, a Skeway, quite different from the standard type which looks down, with a wing span of high over 20 ft., a Lamblin radiator under the fuselage, and a Wright engine of 180 hp., unfortunately was eliminated because it had any chance to give a reasonable measure of its speed. The other two could do so to a comparatively well machine. The "Ox" plane, which had been built and tested and repeated to four passengers, and that with no engine, presumably giving an output of only about 325 hp., and carried them at nearly eighty miles an hour, a performance comparable with that of the Hispano. The Martin Commercial, which was second to the Hispano in efficiency, is, of course, now safe but gone, but has already been fully described in these columns.

## The Yellow Aircraft

Another novelty, in the sense that it was unusual rather than that it was entirely new, in the 800 m. race was the Behrens aircraft, which was the Behrens modified from the Yellow Aircraft, and fitted with extensive modifications, strongly reminiscent of those on the Behrens model. An economy of engine trouble gives great credit to Colonel Lillienthal, who sponsored it, a like claim to slope off, but there is no doubt of its efficiency, because in it the engine was at a constant setting out about 100 m.p.h. and it kept pace with the best machines, though it was not a half notch lower than anything previously considered in the country, even well below the power claimed by the OX5 in England. The most startling conversion in the design is the elimination of shock-absorbers, the trees alone being dependent, probably, for the first time since the Dardennes' case of 1913 that the aircraft from the ground to the air can leave the wheels with great impunity. In a while, it may be, some regular field flight shock-absorbers is likely to be fully tested in fairied landings and in the small and rough fields to which a two-place, perhaps more than any other, will often have to operate. The pilot is placed behind the passenger, and it is not clear what the two places may have really required in commercial aircraft of greater size, though a greater amplitude, however, and the raising of the lowered point of the top of the fuselage to give satisfactory head room in the cabin makes the vision forward from the pilot's cockpit rather poor. It is understood, however, that measures are to be taken to make improvement in that respect.

## The Stent Air Sedan

One of the most important of the machines on display at Wilmer Wright Field was not entered on the race at all. The Stent Air Sedan, representing as it does the first true commercial airplane of fairly large size and having an engine which is to be built in the United States and given a through service, will not be military, and also the first all-metal machine produced in this country for either civil or military use, was worthy of and received the closest

scrutiny. Its existence and its performance confirm a suspicion long entertained by many Americans, that Fokker and French had no special monopoly of the idea, and that the production of monocoque machines can be duplicated by anyone possessed of a certain experience in and talent for design, willing to spend liberally of both time and money, especially the former, in carrying the work through the developmental stages, and willing also to strike out boldly along new lines, something which may appear to be a little old. The first part of this article was typed from a comfortable seat on board of the Stent machine en route from Dayton to Detroit, but a storm forced the abandonment of the trip and the manuscript is being finished on the train.

## Merrill's Jenny

Another interesting exhibit in the "showpiece patch," which appeared in only one race and did not meet with much success there, was the revamped "Jenny" in which M. M. Merrill flew from Dayton to Dayton, a distance of 850 m., without stops, starting with 162 gal. of gas and arriving with 20 still in the tank. There are no official records to that effect, but Merrill's "Jenny" has come quite near setting a record. The world's mark for time over monocoque aircraft is held by the Jenny, as by the OX5. Most of the "Canards" and "Jennies" and Standards and Avions at the field, like Merrill's, have been extensively re-modified, and there are not a great many of any sort. Of the fifty-one machines in the On to Dayton race only fourteen were listed on the entry blanks as of machine flying type. The problem of the Army's surplus stock seems to be making headway toward solving itself.

## The Light Planes

None of all, but second to race in interest and importance were the light planes, of which nine were entered and not actually appeared on the field. The dominant feature of the open class all over was power plant simplicity. Partly, this came from a leader having the record of the race. The four-cylinder engine seemed, on the whole, to act better than the V types, but all alike were bad, and the one American constructor who has prepared an airplane with a fast four monocoque engine has had just about as much trouble with it as with any other. The record of the monocoque engine is the shade of a doubt, that record due to monocoque power plants approaching the 80 m. per sec. rate in service, whatever the merits of the smaller monocoque engine used on the British light plane race of 1921, and to show with almost equal slowness, the shortcomings of the V twin, whatever its claims and construction. The following performances are the best, though not necessarily the most interesting. They are not based on monocoque engine claims to give even one minute of nonstop operation in a flight. One of the most persistent of the group of light plane representatives had their ship out for trial on less than five tons during the week preceding the meet, and on many occasions except one more or less severe engine trouble developed before the machine had been on the air 10 sec.

## The Driggs-Johnson

The most attractive of the light machines, both in design and by virtue of its beautiful construction, was that designed by Driggs, formerly engineer of the Commercial Aircraft Corporation, and now with the Flying Service. It was the best race, but only one is second in the other, after a modification of fixed landing gear at a speed slightly in excess of twenty miles an hour. The machine is distinguished by the use of a monocoque monoplane with an exceptionally high speed ratio, and, as will show the diagram, the pilot being seated in front of the engine, by the use of a monocoque engine which has been projected from the fuselage much further out than is necessary, thus affording exceptionally good vision. The landing around the low-cylinder engine is very neat, so much so that one left some room for the landing, and the whole job is extremely clean in appearance. The equivalent flat plate area in parasitic resistance must have been at least a third more than that of any other monoplane entered. The most notable structural feature was the use of Hydravac wing covering, which has hitherto been confined to flat shapes on which there





of the race there was not a plane in the air! Donney was pleased when he was reached that it was too hazy—he would wait until later to fly. It was fearfully rough.

Donney had a good time. He maneuvered a lot of loops. And they kept high as he made lap after lap with a record speed. And when he completed the course and was announced winner of the first prize we were all very happy.

Johnson came in a close second, and Donney was given third place although he was not allowed to complete the race on account of the unassisted Pulitzer event.



Driggs-Johnson Light Plane Locomotive which won first place in the Dayton Daily News Trophy Race.

The unfortunate experience of the other contestants with unassisted engine failure was very disappointing, especially since one had had the same experience once or twice, and had experienced it at night. The others had the death of good light planes early. It was too bad that the others did not have the plane the same as that we might have had a competition with the performance of the monoplanes. Two of the biplanes were quite nice sport jobs, and handled, one knows, very well. If there had been competition on the part of engine builders, the most would have been a far greater success.

Mr. Donney, who had a day off, was one of the McCook Field demonstrators, and as far as he was concerned was not very disappointed for a light plane engine. He said on landing after the flight from McCook Field, "anyone who advocates a lower load on cylinder displacement might be he condemned to fly an unheated engine." One of the native mechanics nearby asked, "But isn't the British building two-seaters with much more displacement? How do they get away with it?" Mr. Donney, who was a member of the British team, said, "I don't know. He replied that he had thought at first he would not like it at all. "But it's great," he said. When asked if he could sell these machines of his this year, he replied that they were already receiving some orders and expected to build as many as were wanted.

The麻雀 sport light plane, one unheated, also in the markings, would make a nice satisfactory marker, in a very fine little sport plane.

#### The Machines Themselves.

The first light plane entered in these events was the Driggs Johnson "Jazzine," equipped with a four cylinder air cooled Henderson motorcycle engine of 50 cu. in. displacement. Mr. Driggs, its designer, was formerly with the Dayton-Wright Company, and was a member of the 1923 Pulitzer Race team. The engine, as designed, was formerly with the Dayton-Wright Company, and was a monoplane at very high speeds. Although Mr. Driggs claims he does not believe in high aspect ratio or sweep ahead for light planes, many of the early machines had a lot of sweep ahead, and the highest aspect ratio and greatest amount of sweep ahead in any plane one knows of is the *Scorpion*. The span is 27 ft., the area 75 sq. ft., giving an aspect ratio of 9.15. The wing is of one piece, raised about a foot above the fuselage, with the space between the wing and fuselage beautifully covered in by celluloid windows, thus space forming the head room of the little cockpit. The tail was the under surface mounted at this point, and to the tail, the rudder and the top surface in form of a large celluloid window. Henderson pilot's cockpit are not generally popular among pilots, but

one believes that perhaps this little ship will prove the exception. At least as last of poor vision can ever be the excuse. The pilot's view is entirely obstructed all around, in front, behind, and above. The fuselage is covered up at the nose as well as the tail, and the engine is completely hidden in the fuselage because triangular in cross section, with the apex at the rear. The four cylinder motor is completely enclosed on. Air cooling is provided for by baffle plates and air ducts which conduct an equal volume of air to all the cylinders. All air ducts underneath the sweep under the tail.

These structural members are of steel tubing. The two upper longitudinal members are of steel tubing. The sides to the single tube at the top of the rear portion. The triangular section is carried back to the fuselage. Tail members are of welded steel tube construction. They are thin, extremely braced plates, of quite small but quite wide section. The engine is mounted directly on steel tube to remove heat from the body. The engine is mounted on a steel tube to the tail under the wing. Great care is taken in the pilot's seat which is directly in back of the engine. In fact the rivets are in under the rear of the engine itself.

A steel frame framework of steel tubes, entirely enclosed within the nose connects the fuselage with the wing, which is of the box type construction with a single span construction at the top of the nose. The engine is mounted on a steel tube, the No. 45, which looks very much like some of the Clark sections except that it has a slight under camber. It is covered forward of the rear spar with thin ply wood veneer, giving a perfect wing surface and providing torsional bracing. The wing tapers from a 4 ft. chord at the outer panel to 2 ft. at the center of the tip. Elliptical wing tips and a straight tail fairing give it this wing an extremely fine appearance, and some excellent roll control and high performance. Its maximum 2/L/D must be higher than any unpowered full scale wing known.

The landing gear consists of two Pulitzer 35 ft. 4 in. wheels on a straight axle which operates in a slot in a single side strut. The slot is to separate the upper and lower struts other than the side, across the wheel. Disc brakes are mounted on the struts to stop the gear on deck. Side struts are attached to the struts every 18 in. The landing gear strut fair and stiff. The weight schedule is 325 lb. empty and 500 lb. gross, giving a power loading of something in the neighborhood of



Milwaukee Light Plane which won the Speed and Efficiency Contest for Light Planes.

52 lb. per horsepower. The wing loading is 16.5 lb. per sq. ft. Some difficulty was experienced with the struts, and only since the Henderson people offered no cooperation whatever on the project. A standard model was used, the only change being that required for providing a propeller hub. Transmissions and flywheel were removed, and a thrust bearing added at the old flywheel flange. The propeller shaft was added to this flange and a front plate of cast aluminum bolted to the front of the flange. The main struts were made of steel and could not for some reason be put in the nose. The nose and cockpit was far more interesting than the motor itself, and one expects of being somewhat like *Scorpion*. Its weight is over 6 lb. per kp., and its mean effective pressure about half that of a good air cooled engine. But it is, and that very well—which is one of the most all important things for a light plane motor to do. On the whole, the Driggs Johnson plane has proved what is, perhaps, the only real success in this year's races with the possible exception of the short "Pulitzer." The rolls "Jazzine" is clean, slick and

cleverly arranged and constructed, and would, one believes, be a joy to fly, as it is to watch.

The second light plane on the program also contained a Milwaukee "Jazzine" in its markings. The plane was designed and built by Mr. Donney of the Engineering Division of the Air Service. It was planned with the one idea in view of extreme simplicity and cheapness of construction. And it may well be that that idea was attained. Mr. Donney's purpose in making this plane was to demonstrate the belief that after the first flight the machine was unchanged "the better" after the first flight. The machine was extremely simple, having only a single cylinder, a single carburetor, and a single propeller, and the landing wing struts carried one of smaller gauge of light construction.

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# UNITED STATES AIR FORCES

## U. S. ARMY AIR SERVICE

### Douglas World Cruisers for the Philippines

The Air Service News Letter correspondent at Manila, Paul Miller, P. I., states that official information was received that orders have been placed for six Douglas World Cruisers (modified) to be shipped to the squadron stationed at this field. He states that this is, indeed, good news and that with such equipment it will be possible to do some real work and make some nice inter-island trips. While the Douglas B-17s are available, they have not as yet performed and deserve a rest period. It is necessary in view of the damage and complaints from either side of the island of Corregidor it will be possible to fly almost daily the year round, which is essential. At present, for at least three months, flying is problematical, due to rough seas on the south side of the island. If a truck system were installed whereby planes could be transported from one end of the island to the other, the problem would be solved. The Douglas planes, having bogies on both sides of the island, due to the fact that any number of planes could be transported back and forth with the truck system.

### San Antonio Air Intermediate Depot

During the month of August the Engineering Department of the San Antonio Air Intermediate Depot, Kelly Field, Tex., under the direction of First-Lieutenant Edward M. Powers, completely overhauled and repaired the following airplanes and engine: Arado 96, 200 hrs.; 3. MITSUB. 2 JRM-1, 100 hrs.; 4 MITSUB. 200 hrs.; 4. MITSUB. 200 hrs.; 5. Wright A2, 8 Wright 21, 11 Wright E, 6 Wright E, 1 Wright E.

In addition to the above, the Engineering Department is preparing one G41 airplane, among several others, for entry in the International Air Races to be held at Dayton, Ohio, in October.

The printing of one year, from Sept. 1, 1935 to Aug. 31, 1936, by the Engineering Department of the above Depot, completely overhauled and rebuilt 382 airplanes and 229 engines, estimated as follows: Arado 96—100 hrs.; 17 DORNIER—100 hrs.; 4 DORNIER, 1 G41, 30 hrs.; 300 hrs.; 2 Hispano 3, 75 hrs.; 37 MITSUB. 75 hrs.; 6 BIRM. 3 MBS—100 hrs.; 1 Sperry M2A, 2 Vought V-164—100 hrs.; 100 hrs.; 120 hrs.; 120 hrs.; 115 Wright E, 20 Wright E, 20 Wright 21, 21 Wright 21.

The average 138 planes and 227 engines per working day for the above period. The above year's production exceeded that of the previous corresponding period by 17 planes and 139 engines.

### Air Service Activities in Hawaii

During the preceding six months, the 5th Composite Group at Lake Field, Hawaii, composed of the 23rd and 25th Base Defense Squadrons, 40th and 15th Pursuit Squadrons, 4th Service Squadron, 11th Photo Section, and 42nd Air Intelligence Squadron, with several detachments, flew a total of 3000 hrs. and maintained a monthly average of 50 per week hours in operation.

From the first inter-island flight, after a lull of two years, to October 1, 1935, landing fields have been gradually established on all of the five main islands of the archipelago, from Niihau to the far west, Kauai, Oahu, Maui, Lanai, and Hawaii, with the following stations of importance and commercial importance are marked as follows: Oahu, Hawaii, Kauai, Maui and Lanai. Fields were also established on Lanai and Niihau.

Mostly inter-island flights are scheduled in training pro-

grams, and many special flights are made in addition. The airway system is still in the rough, and the slowdown in development has been due to restricted negotiations published by Department Headquarters and shortage of suitable equipment. It is expected that by October there will be an complete airway system as there is in the States.

The civilian population has cooperated in working with the Air Service in establishing the airfield and the Airway System. It has been easy to disseminate the news of what is to be done, as the islands are separated by channels ranging from 10, 20, 30 to 60 mi. wide and traversed by slow and small boats.

### Plane Combat Locusts in Philippines

Capt. R. L. Johnson, who is connected with the Masius Sugar Company at San Jose, Mindanao, and who has helped the Air Service in building and maintaining one of the last flying fields in the Islands at San Jose, paid a visit recently to Manila, on business, and while there, he reported that the Locusts in the northern part of the island were still under way and that the greatest heavy rain areas are helping to check the locust spread. A J-2D airplane has been purchased by the Bureau of Agriculture, and it is being flown by a civilian pilot who has been invited by Lieutenant McCloskey of Camp Edwards. The Bureau of Agriculture is using this airplane to keep up the work at San Jose which was started by Capt. R. L. Johnson.

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The course also included lectures in training subjects and in shop work. For a certain period of time these officers were attached to squadrons of the field and as that way became familiarized with the shop sections, and as a result, many improvements were made in their operations. These improvements were: 2nd Lieutenant Peters, Wood, Navigation, Pathfinders and Pilot of San Antonio, Captain of Bremerton, Emory of Tulsa, Okla., Major of Palisade, Tex., and Bishop of Houston, Tex.

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October 13, 1936

AVIATION

### San Diego Plans Fine Gift to Lieut. Smith

To make preparations for the homecoming welcome on Nov. 4, Lieut. Lowell H. Smith, commander of the "Stand-By-Us" flight, the San Diego group stated that the Chamber of Commerce is working on a plan to present Lieutenant Smith a fine gift. The Chamber of Commerce of the representation of the people of San Diego. It is size reserved that Lieutenant it will have to himself a brook, which will make the lounge very appropriate and fitting gift.

### Army Air Orders

Capt. William E. Kepner, A. S., Aberdeen Proving Field, to Fort Meade.

Several Orders No. 150, relative to George Douglas Corrigan, Jr., C. H. Air Corps, revoked.

Capt. Orville No. 201, relating to Sec. Lt. Albert James Tu, A. S. Off. En. Corps, amended to direct Lieutenant Tu to present to Springfield, Ill.

Capt. Lowell H. Smith, Lieutenant William, A. S. Off. En. Corps, to active duty Middlekauf Air Int. Dep., reverting to inactive status Sept. 26.

Capt. Hendon Ferguson Slingsby, A. S. Off. En. Corps, Minneapolis, to active duty Ch. A. S. Washington, reverting to inactive status Dec. 15.

Each of the following officers A. S. Off. En. Corps & Airship Sch. to Army Com. Off., Box Field, First Lieuts. Benjamin E. Lomax, Orval J. Butler, Sec. Lieuts. James F. J. Early, Edward C. Clegg, and Charles W. Wadsworth, J. Paul.

First-Lieut. Charles R. Evans, Jr., Kelly Field to Fort Meade.

Sec. Lt. No. 217, relating to First-Lieut. James Howard Knobberger, A. S. Off. En. Corps, amended to order Lieutenant Knobberger to active duty Sept. 29 and to revert to inactive status Oct. 11.

Sec. Lt. Edward C. Clegg, A. S. Off. En. Corps, to Kelly Field.

First-Lieut. Douglas Johnson, A. S. Off. En. Corps, to Sec. Lt. Ind. Com. Off., Box Field.

Sec. Lt. Edward J. Austin, A. S. Off. En. Field, to Phillips Field.

First-Lieut. Howard K. Easney, A. S. Off. En. Field, to New York City, on transport for P. L. Lee 12.

Sec. Lt. Theodore Kelly, A. S. Off. En. Field, transferred to the grade of Sergeant in Headquarters Squad.

First-Lieut. Edward T. Carter, A. S. Off. En. Field, to Rockport, A. L. Dep., San Diego.

First-Lieut. Willis D. Ware, Strickland, A. S. Off. En. Corps, Springfield, to active duty Indiana, reverting to inactive status Oct. 15.

Sec. Lt. Edward C. Clegg, A. S. Off. En. Field, to Brooks Field.

Sec. Lt. Paul Albert Dickhess, A. S. Off. En. Field, to Fort Meade.

Capt. Elmer E. Skeel, A. S. Off. En. Field, to San Antonio.

Sec. Lt. Paul E. Kepner, A. S. Off. En. Field, to San Antonio.

Each of the following officers A. S. Off. En. Corps & Fly Sch. Brooks Field, to A. S. Off. En. Fly Sch. Kelly Field, Fort Meade.

Capt. Ross G. Hoyt, First-Lieut. Frederick W. Evans, Arthur Thomas, Richard T. Bremerton (Field Art.), William C. Farney, Sec. Lieut. Emory C. Cushing, Harry E. McLean, Elmer Moly (Inf.), Ernest S. Moon, Charles D. McVay (Inf. Art.), Arthur V. Janes, O. P. Wadsworth (Inf. Art.), Edward H. Clark, James C. Frazee (Inf. Art.), Robert D. Bowles, Jr. (Inf. Art.), Dan W. Mayhew (Field Art.), John C. N. (Inf. Art.), George F. Schulgen, Oscar C. Stewart, Elmer T. Bremerton.

First-Lieut. John P. Richter, A. S. Off. En. Field, to San Antonio.

Capt. C. E. Byrne, A. S. Off. En. Field, to Ch. A. S. Woodring.

First-Lieut. Ulysses G. Jones, A. S. Off. En. Field, to Fort Meade.

First-Lieut. Edward A. McGinnis, A. S. Off. En. Field, to Fort Meade.

First-Lieut. Russell C. Macmillan, A. S. Off. En. Field, to San Antonio.

New York City, sailing on transport via Government transportation for Hawaii Nov. 12, 28.

First-Lieut. John J. O'Donnell, A. S., Fort Meade, to San Francisco, sailing on transport for Hawaii in Feb. 18.

Capt. Lester T. Miller, A. S., Kelly Field, to San Francisco, sailing on transport for Hawaii in Feb. 18.

A. S. Off. En. Corps.

Sec. Lt. Louis Lee, Gifford, Illinois, III, Weston Kyle, Jr., Gifford, Illinois, On, Henry Barbara, Peoria, Gifford, to Brooks Field, for transportation, reverting to inactive duty of separation of four months, one month.

Sec. Lt. Louis Richard O. Thomas, Jr., A. S., Brooks Field, to Fort Meade.

Sec. Lt. William L. Scott, Jr., A. S., Brooks Field, to Fort Meade.

## U. S. NAVAL AVIATION

### New Gas Cells for the Shenandoah

Andras, Inc., of Elkhampstead, N. Y., have completed for U. S. Navy the first order of replacement cells for the dirigible Shenandoah. Two of the new cells have been delivered to the Shenandoah for her transcontinental flight. Navy Department tests indicate that the new gas cells are superior to any others that have tested.

### Take Part in Battle of Antietam

The planes from the Marine Flying Field at Quantico, Va., made a total of 858 flights during the recent maneuvers of the Marine Troops from Quantico that culminated in the "Battle of Antietam" on Sept. 26, 1936. The total flying time for the Quantico planes during these operations was 350 hr. 45 min., and 782 passengers were carried.

### Forestry Patrol in Oregon

Annual forestry patrol operations are being carried out in Oregon by Lieut. Lloyd Barrett and Capt. Fred Kelly, of the 1st Aero Squadron, stationed at Cessna Field, Pendleton, Oregon, and Lt. Knobberger, C. H. Air Corps, to conduct the patrols in the state's eastern forest areas.

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"Crash Boat" at San Diego

The "seascooter" or search boat at the Naval Air Station, San Diego, Calif., has been redesigned and equipped with a reversible propeller, making it possible to stop the craft within a few feet. It is now possible to go alongside of a wreck at high speed without damage to the wrecked plane or its occupants. It has a maximum speed of 40 m.p.h. and is being fitted with diving apparatus and complete search equipment. The low draft of the seacraft enables it to go in very shallow water where the ordinary sea skid or motor boat would not go.

### Torpedo Plane Refuels at Sea

An important demonstration of the progress that has been made in sea-going aviation in the Navy was recently held off the California coast, near San Diego. A B2C Navy torpedo plane, piloted by Lieut. Ben H. Wysor, U. S. N., was successfully refueled from a destroyer in the open sea. The fuel being passed from ship to plane by means of a hose while the destroyer was rolling twenty degrees. In spite of the

### CALENDAR OF AERONAUTICAL EVENTS

Oct. 24-25. Schneider Cup Race, Baltimore.

Dec. 17. Twentieth anniversary of the first successful airplane flight.

Dec. 5-21. International Aircraft Exposition, Paris, France.

rough water the plane took off without difficulty after removing the gasoline.

One question each of this type, the Douglas torpedo planes form a part of the main organization of the Scouting Fleet, the Battle Fleet and the Asiatic Fleet. The excellent service that these planes have rendered during the past two years has aided at a spur to further development along the same lines. The result of this development is shown in the complete success of the CBB, which recently took all the world's record for speed and endurance in the air and distance flights, as well as the world's record for endurance over distances of 800 km and over.

While the DTE type is regarded presently as a torpedo bombing plane, it possesses unusual qualities for long range scouting and bombing. This is reflected in the CBB which has been developed from it, and is known as a "three gunner" type for the three crews mentioned above.

#### Navy Ready for ZRS

A suitable name would be the Naval Air Service for the ZRS, the twin hull airship which is expected to go into service about Oct. 6. The transatlantic carries the In-

door airplane, missing Daughter of the Stars. It is hoped that it will open a new era for the new air carrier carrying out its mission.

The last preparation necessary to receive the ZRS already is under way. Troop squadrons have been sent to Naval Field, Boston Air Port, Langley Field and Port Island to serve as emergency ground crews should unforeseen weather conditions force a water landing at Langley.

At Langley, the ZRS is to be used for weather observations of the North Atlantic before receiving orders to take their stations. These are the soaring coast ship Patria, station ship, Detach, observation ship, and Bremen, supply ship.

#### Naval Air Orders

Lester B. Baron, J. Conwell, Capt. Bu. of Aeron., Navy Dept., in  
Aviation, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th, 101st, 102nd, 103rd, 104th, 105th, 106th, 107th, 108th, 109th, 110th, 111th, 112th, 113th, 114th, 115th, 116th, 117th, 118th, 119th, 120th, 121st, 122nd, 123rd, 124th, 125th, 126th, 127th, 128th, 129th, 130th, 131st, 132nd, 133rd, 134th, 135th, 136th, 137th, 138th, 139th, 140th, 141st, 142nd, 143rd, 144th, 145th, 146th, 147th, 148th, 149th, 150th, 151st, 152nd, 153rd, 154th, 155th, 156th, 157th, 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IN the "Outline of History", H. G. Wells writes that "by 1909 the aeroplane was available for human locomotion." It is an interesting coincidence that since 1909 exactly, The Glenn L. Martin Company has been building quality aircraft.

Without discounting the vital importance of airplanes in military and strictly governmental use, it seems certain that man's most useful exploitation of the air is destined to be as a medium for his own transportation in commerce and industry.

With this end in view, Martin Margins of Safety have not only been maintained since 1909 at an unusually high point, but are being steadily advanced today to new standards. Martin engineering practice is an ever-growing power for the improvement of human locomotion.

**THE GLENN L. MARTIN COMPANY**  
CLEVELAND

*Builders of Quality Aircraft since 1909*





THROUGH the entire history of aviation over a period of 20 years the Wright organization has maintained its high position. Its leadership has been soundly built upon extensive research and intelligent engineering development, although its experience includes the manufacture of aeronautical equipment in extremely large quantities.

The Wright organization, ever mindful of its first achievement—the art of flying—continues to contribute each year its best ability and engineering experience to the advancement of flying.

WRIGHT AERONAUTICAL CORPORATION  
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Navy ships equipped with Wright Air  
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